Idaho National Laboratory summer interns get real-world experience, hands-on opportunities

By Kimberly Hirai, University of Idaho, Idaho National Laboratory Nuclear Science and Technology communications summer intern

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Albertson College of Idaho senior Megan Longo (left) and St. Cloud State University graduate Jessie Shipp (right) maneuver manipulators inside a hot cell at INLs Materials and Fuels Complex this summer.

When environmental chemistry major Jessie Shipp attended school as an undergraduate at St. Cloud State University, classes often consisted of theory-based work. But internships at Idaho National Laboratory offer the real-world experience one can't get at school, according to the summer intern.

"You're actually seeing research and chemistry and what it's for," Shipp said.

She said she also gets to work with instrumentation not found at universities and sees the life of a project from its beginning to the final product.

When it comes to the hard sciences, "nuclear engineering seems to be the hot topic," said Shipp.

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Senior Albertson College of Idaho student Megan Longo pipettes standards in a lab at INLs Matierals and Fuels Complex under the supervision of chemistry lab technician Marcos Jimenez. Longo used spectrometry to determine the higher wavelengths of actinides for easier detection of the elements in research environments.

And for students with internships in the Nuclear Science and Technology Directorate of INL, this summer proved to be a challenging learning experience in a field that has gained international attention and growing importance.

This summer, 101 students from 19 different states and Korea were awarded internships in Idaho National Laboratory's Nuclear Science and Technology Directorate. The students represented 31 universities and high schools.

Chemistry and physics major Megan Longo received a Department of Energy Office of Science Undergraduate Laboratory Internship (SULI) with INL this summer.

"It's amazing to be on the cutting edge of technology," she said.

A senior at Albertson College of Idaho, Longo used an Inductively Coupled Plasma-Atomic Emission Spectrometer (ICP-AES) to analyze actinides, the radioactive components of spent nuclear fuel. Longo isolated higher wavelengths of the material using the spectrometer, and entered the wavelengths into a computer system. Excited electrons from an element emit energy at specific wavelengths when returning to ground state. The intensity of that energy at a single wavelength is proportional to the concentration of that element in a sample.

In late June, Longo examined the higher wavelengths of plutonium standard to ensure the wavelengths of the sample had been entered into the computer system. Wavelengths are used for a variety of research projects. Higher wavelengths improve the detection limits for elements. An example is cesium. Before discovering a higher wavelength at the 893 nm line, the element was typically analyzed at the 455 nm line. The higher wavelength, in addition to displaying higher detection limits, has less interference with other elements.

Longo enjoyed the access to scientists and equipment. She said the spectrometer she worked with this summer is one not often found in university science departments, if at all. Longo said the opportunity to speak with experts was also helpful.

"If there's anything you want to learn about, they'll get the technician to tell you about it," she said.

"That is what our programs are all about," said Una Tyng, University Programs lead in the Education Programs Department.

Tyng said internships at INL help students discover the exciting aspects of their field and give them the experience they need to make future career decisions. Like Longo, Shipp mentioned the hands-on experience as an advantage to her graduate INL Nuclear Science and Technology internship. She also said their mentor, Jeff Giglio, ensured they were getting the most from their time at INL by giving them access to scientists with related expertise. Giglio is a chemist in the analytical lab at the Materials and Fuels Complex.

This summer, Shipp participated in method development on a project involving nuclear forensics. Shipp examined strontium samples and other trace elements in the samples to identify where they may have been made. The procedure uses age dating to date the sample. Further tracing of elements and isotopic analysis allowed Shipp to "fingerprint" the substance, or link it to where it may have originated. Shipp was working with nonradioactive samples at the time, but projected the work would allow her to apply the method to a real strontium-90 source in July.

At the end of their terms, Longo and Shipp will continue their individual pursuits. Longo said her dream job would be in a position with NASA. "But I would definitely come back to INL," she said.

INL Fuels Development mechanical engineer Jared Wight did come back to INL - twice. Wight received a SULI internship in summer 2004. He conducted modeling of gas-cooled fast reactor fuels as part of the Next Generation Nuclear Plant project at Argonne National Laboratory-West (ANL-W) under Mitchell Meyer. Wight secured part-time work with the Reduced Enrichment for Research Test Reactors program at ANL-W

while attending school as a senior mechanical engineering major. He continued work in the program as an intern the summer following graduation from Brigham Young University-Idaho.

This summer marked the third year Wight has worked at INL, and the second year he has mentored an intern. His mentor, Meyer, has now become his manager.

"I think it teaches you a lot about how to apply what you're learning in school or how engineers and scientists actually apply what they did in school," said Wight of his internship experience. "That to me was very valuable."

Wight also said working at INL prepared him for his career.

"It's hard for someone going into an engineering or scientific field to have any type of prior work experience when they graduate from a university unless they've done something like this," he said. "I think also it helps you to know whether or not what you're doing in school is what you really want to do."

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Recent St. Cloud State University graduate Jessie Shipp works in a glove box as chemistry lab technician Jana Northam watches. Shipp participated in method development to fingerprint strontium samples in order to trace where they may have originated.

Though many students obtain internships to study other scientists' research, Ph.D. student Kurt Terrani found INL the only laboratory where he could conduct his own. A student at University of California, Berkeley, Terrani wanted to study thorium containing hydride fuel. Terrani contacted entities in the United States, Europe and Asia in search of a thorium source, but none were available or willing to supply the metal. After discovering INL held a source, Terrani secured an internship with Nuclear Programs.

This summer, Terrani studied the fabrication, characteristics and behavior of hydride fuel, a product consisting of thorium, uranium and zirconium. More specifically, Terrani analyzed the fuel's compatibility with a fuel concept which would achieve a high burn of plutonium and minor actinides in a light-water reactor setting. Terrani also took safety and nonproliferation perspectives into account while conducting his research. He said while every internship is an opportunity, the environment of a national laboratory is unique.

"It's nice to be exposed to the way these guys do their job," he said.

Terrani said the internship also broadened his background in nuclear and materials subjects and gave him experience in a national laboratory rather than a business setting. He also experienced the technical approvals that come with working with radioactive materials and hazards issues.

"Every step of the game takes a long time," said Terrani. "But when you get there, it's nice."

In addition to those with internships in Nuclear Science and Technology, five individuals received internships on faculty sabbatical or were conducting research from various universities.

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